BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Mechanical Engineering Pearson BTEC International Level 3 Diploma in Manufacturing Engineering Pearson BTEC International Level 3 Diploma in Aeronautical Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Mechanical Engineering Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering
Unit number and title	**Unit 26: Mechanical Behaviour of Non-metallic Materials**
Learning aim(s)	**C:** Explore the in-service failure of non-metallic components and consider improvements to their design
Assignment title	Investigating in-service failure of components and proposing design changes to improve their performance.
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are working as an apprentice technician for a large company that manufactures mechanical, structural and bodywork components for the automotive industry. The quality manager is impressed with your excellent knowledge of the mechanical properties of non-metallic materials and your ability to carry out practical investigations. You have now been moved into the life cycle testing team so you can work with colleagues who have responsibility for carrying out endurance tests on components. The data this team collects is used to inform design improvements to service critical components that must be capable of working in challenging environments without mechanical failure or material degradation occurring. You will also be involved in this component redesign process.
Task 1	You are going to inspect engineered components that have failed in service, establish the causes of failure and propose design modifications to prevent the problems from recurring. You will be investigating mechanical failure, for example brittle fracture caused by overloading, and failure due to material degradation, for example the breakdown of polymers upon prolonged exposed to UV light. **To do this:** Your tutor will provide you with a small selection of failed

	and/or unserviceable components and information about the loading conditions and environment under which they operated. **You need to:** • Visually inspect at least two components which have suffered mechanical failure and identify the causes of the failure. For example looking for the classic signs of fatigue (crack propagation, growth, crystalline tear) by comparing with reference sources. • Visually inspect at least one component which has suffered material degradation and failed or become unserviceable and identify the causes of that degradation. • Investigate design changes that will prevent or mitigate the problems that you have identified. Design changes could be modifications to the physical shape of a component or changing the composition of the material. **You then need to:** Present your findings in an organised technical report which should include: • Annotated images of the examined components. • Detailed annotated images of fracture surfaces/components and information about why failures occurred, with reference to mechanical design principles. • A range of design improvements for the failed components, with reference to mechanical design principles to justify the suggested modifications.
Checklist of evidence required	A portfolio containing a log book and report including annotated images and commentary, test results, sketching, learner observation records etc.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
26/C.D3	Evaluate the results of the visual inspection of three non-metallic components and the mechanisms by which they failed, justifying a design solution that should prevent recurrent failure from a range of alternatives.
26/C.M5	Conduct a visual inspection to accurately identify the mechanism by which three non-metallic components failed in service.
26/C.M6	Analyse the mechanism by which three non-metallic components failed in service, justifying detailed design solutions that should prevent recurrent failure.
26/C.P6	Conduct a visual inspection to identify the mechanism by which three non-metallic components failed in service.
26/C.P7	Explain the mechanism by which three non-metallic components failed in service, suggesting design solutions that should prevent recurrent failure
Sources of information to support you with this Assignment	Books Materials for Engineers and Technicians 6th Edition; Bolton W, Higgins R A; Routledge, 2014; ISBN 978-1138778757 Websites matweb.com makeitfrom.com
Other assessment materials attached to this Assignment Brief	Reference images Components, each accompanied by information about the conditions under which it has been operating, for example, loading, temperature, environment (e.g. corrosive)